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LLNL-CONF-618472

NIF Target Fabrication

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February 13, 2013

Conference on Lasers and Electro-Optics
San Jose, CA, United States
June 9, 2013 through June 14, 2013

Disclaimer

NIF Target Fabrication

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NIF targets are complicated assemblies, often requiring novel materials. Creating these targets requires innovative materials science and precise engineering. Components are machined to 1 micrometer tolerances and capsule surfaces are smooth to a few nanometers.

Faster, Less Expensive Laser Glass Production

Laser glass is the material that amplifies laser light to the extremely high energies required for experiments. NIF uses 3,070 large plates of ultra-pure laser glass containing atoms of neodymium. Each glass plate is about three feet long, a foot and a half wide, and two inches thick. Stacked end-to-end, the plates would form a continuous ribbon of glass 1.5 miles long. To produce this glass quickly, NIF developed a new production method, in partnership with Hoya Corp., USA and Schott Glass Technologies, Inc. Once cooled, the glass is cut into pieces that are polished to the demanding NIF specifications.

Large Aperture Optical Switches

A key component of NIF's powerful amplifiers is an optical device called a plasma electrode Pockels cell, or PEPC, invented by NIF scientists. Using its unique plasma electrodes and a KDP crystal, it changes the beams' polarization to trap the beams and make four passes through the main amplifier glass. The optical switch then rotates the polarization back to its normal configuration, letting the beams travel on to the target chamber. Without PEPCs, NIF's beamlines would have to be much longer than they are.

Deformable Mirrors

The deformable mirror uses an array of 39 tiny arms to bend its surface to correct for distortions that accumulate as the laser beam travels through the large number of optics in the laser amplifier. The mirrors, one for each of NIF's 192 beams, are located at the end of the main amplifiers. The mirrors' precise adjustments, software controlled, help to focus the beams to the required spot size of about 250 microns, about the diameter of a human hair.

This work was performed under the auspices of the U.S. Department of Energy by Lawrence Livermore National Laboratory under Contract DE-AC52-07NA27344.